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The Effect of Fiscal Shock on Inflation and Economic Growth in Developing Countries

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ABSTRACT

This paper examines the effect of fiscal policy on economic growth and inflation by using government expenditure and taxes. For this purpose, selected data from developing countries is used for the period 1990-2011. PVAR approach has been applied to study the effect of shocks on macro variables. The results of impulse response function and variance decomposition implies that economic growth will increase through government expenditure shock in short term, but in long term it is the opposite. The government expenditure shock decrease inflation. Shock of taxes, in short run, promotes slightly economic growth and in long term have no effect on growth. Moreover, at the beginning of the period, inflation is reduced following total tax shocks, but it slightly is increased in subsequent periods.

***Keywords*:** fiscal policy; panel data; PVAR

1. INTRODUCTION

Behavior of many macroeconomic variables is influenced by fluctuation and economic shocks. Although economic schools accepted existence or occurrence of this shocks, the main difference between economists are about the nature and origin of business cycle. Appropriate policies to minimize the negative effects of shocks on structure of the economy not only was not the same between economists, but also has stirred a lot of controversy. One of the most important reasons of these differences is related to diversity of doctrines of economic school about existence or lack of efficiency in implementing of economic policies. One of these policies is fiscal policy. Economists focus more on this policy perhaps because of the feature of its tool. For instance, according to the duration of impact of fiscal policy compared with monitory policy, and undeniable effects of fiscal policy on macroeconomic variables (private consumption, investment, income distribution, welfare and etc.) at least in short term, governments are more tend to apply fiscal policy. The main instruments of fiscal policy are government expenditure and taxes. The significant point is that the effects of fiscal policy shocks are not the same in different countries. Developing countries have an inefficient tax system that is not able to meet government financial and tax goals. For this reason developing countries need modern and stable tax system to do their best in economy.

Recent development in the theory of growth, endogenous growth, examine the role of fiscal policy to determine growth rate is possible. Taxes have both positive and negative effects on economic growth, increase in taxes lessen the efficiency of investment, research and

development. Lower efficiency meaning lower capital accumulation and lower innovation, and thus lower economic growth rate. It is related to negative impact of tax, taxes can also have positive impression, some public expenditure such as infrastructure improvement, general education, and health care, lead to enhancement of efficiency. This question about how tax policy has effect on growth through investment encouragement, or disruption investment decision, or labor reaction to taxes, has repeatedly been raised.

Barrow model connects the roles of government in the field of infrastructure service, protection of property rights, and tax policy with growth. This model demonstrates that government activities have impact on growth rate in long term.

This model considers G as total government expenditure, and production function is defined as follow:

$$Y_t = AL^{1-\alpha}{}_t K_t{}^{\alpha} G_t{}^{1-\alpha} \quad (1)$$

A is a positive constant, G is government cost for general expenditure, for a given level of public input, the function has constant returns to scale with respect to K and L.

We survey the school's vision for theoretical analysis about relationship between fiscal policy and taxes. Classical view is based on this assumption that say there is no money illusion and decision making is influenced by real wages. Fiscal policy in classic mode leads to increase in the level of price, and it has no impact on production. In contrast, Keynesian view is based on this assumption that say economic agents are not able to understand the impact of change in price on their economic status completely, and their decision making in influenced by nominal wages and its changes (money illusion). Fiscal policy in this mode lead to shift the aggregate demand curve and level of price and production are changed consequently. This study assists us to response to this question that expresses how fiscal policy shock (government expenditure and taxes) in developing countries have impact on growth rate and inflation. For this purpose, cross country data for the period 1990 to 2011 and PVAR approach are used. In the second part of study the research model will be reviewed, and in the third part experimental results are discussed by using response function and variance decomposition approach.

2. DATA AND METHODOLOGY

In present research, panel vector auto regressive is used to survey the effect of fiscal policy on structure of the economy and to determine the length of lag of variables. In this method panel data and vector auto regression are combined, for this purpose, the following equation with p lags is introduced.

$$y_{it} = \Psi_0 + A_1 y_{i,t-1} + A_2 y_{i,t-2} + \ldots + A_k y_{i,t-p} + \alpha_i + \lambda_t + u_{it} \quad (2)$$

In the above model, y_{it} is a K*1 vector by endogenous variables that is introduced as below:

$$y_{it} = (CPI_{it}, Gro_{it}, Gov_{it}, ITax_{it}, InTax_{it}, TTax_{it})' \quad (3)$$

In the above equation:

CPI: consumer price index to measure inflation
Gro: economic growth
GOV: the ratio of government expenditure to GDP
ITax: the ratio of income tax to GDP
InTax: the ratio of consumption tax to GDP
TTax: the ratio of total tax to GDP
In equation (2),

Ψ_0: intercept

A_j: square matrix K*K, estimated coefficients of the explanatory variables

α_i: unobserved effects section

λ_t: time effects

u_{it}: error term

and also n, i = 1, 2, 3, … , t = 1, 2, 3, … are countries and time respectively.

Due to the heterogeneity cross sections, for estimating equation (4), the fixed effects method is used.

$$y_{it} = \alpha_i + y_{i,t-i} + u \qquad (4)$$

The data is for 14 developing countries[1] for period 1990 to 2011 from WDI. Data limitation was the reason to choose selected countries.

In order to avoid the spurious regression, the data are examined in terms of stationary. "Im, Pesaran, Shin" test (2003), and "Peron" test, (2000) are used to detection stationary. In both tests H_0 hypothesis states that the model has unit root, results are included in Table 1.

Table 1. Unit Root Test.

Im, Pesaran, Shin	PP	Variables
(0/0015) -3.96	(0/0000) -8.04	CPI
(0/0030) -3.12	(0/0004) -6.13	Gro
(0/0064) -2.49	(0/0008) -4.41	CG
(0/0021) -3.58	(0/0012) -5.01	TTax
(0/0035) -3.04	(0/0063) -2.31	ITAX
(0/0023) -4.08	(0/0002) -3.14	INTAX

[1] - Argentina, Brazil, Bulgaria, Iran Islamic, Indonesia, Kazakhstan, Kuwait, Kyrgyz, Nepal, Pakistan, Peru, Philippines, Singapore, Venezuela, RB

Stationary test results show that the variables in levels are stationary. Therefore, the difference does not exist. Before estimating the presented model, it is necessary to identify the optimal number of lag. For determining number of lags we used Schwarz, Akaike and Hannan-Quinn criterion. In the case of VAR all the criteria, (AIC, SIC and HQC) recommended a joint lag 2.

Table 2. Optimal lag length selection for PVARs.

HQC	AIC	SIC	Lags
54.43082	53.51746	55.76973	0
49.06568*	47.56517*	51.26533*	1

3. EMPIRICAL RESULTS

Impulse response function is used to describe the dynamic behavior of desired pattern. This function demonstrates reactions of endogenous variables to shock from error term in equation. According to impulse-response function, results from tax and government expenditure shocks are summarized in the following table.

Table 3. Impulse Response Function.

Total tax Shock	
A positive impulse in TT determines a small decrease of CPI's level in the short term. In the medium and long term tend to zero.	CPI
A positive impulse in TT determines a small increase of GNP's level in the short term. In the medium and long term tend to zero.	GṄP
Government Expenditure shock	
A positive impulse in GE determines a decrease of CPI's level. There is a high intensity reaction in the first 2 years (short term), and a significant one during the rest of the interval.	CPI
A positive impulse in GE determines a small increase of GNP's level in the short term. In the medium and long term determines a flat decrease of GNP's level.	GṄP
Indirect Tax Shock	
A positive impulse in IDT determines an increase of CPI's level with 1 lag. There is a medium intensity reaction in the rest of the interval.	CPI

A positive impulse in IDT determines an increase of GNP's level in the short term. There is a high intensity reaction in the first 2 years (short term), and a significant one during the rest of the interval.	$\dot{GNP}$
Direct Tax Shock	
A positive impulse in DT determines an increase of CPI's level in the short term. In medium term it tends to zero and in long term CPI decrease.	CPI
A positive impulse in DT determines a flat decrease of GNP's level in the medium and long term. There is a high intensity reaction in the first 2 years (short term), and a significant one during the rest of the interval.	$\dot{GNP}$

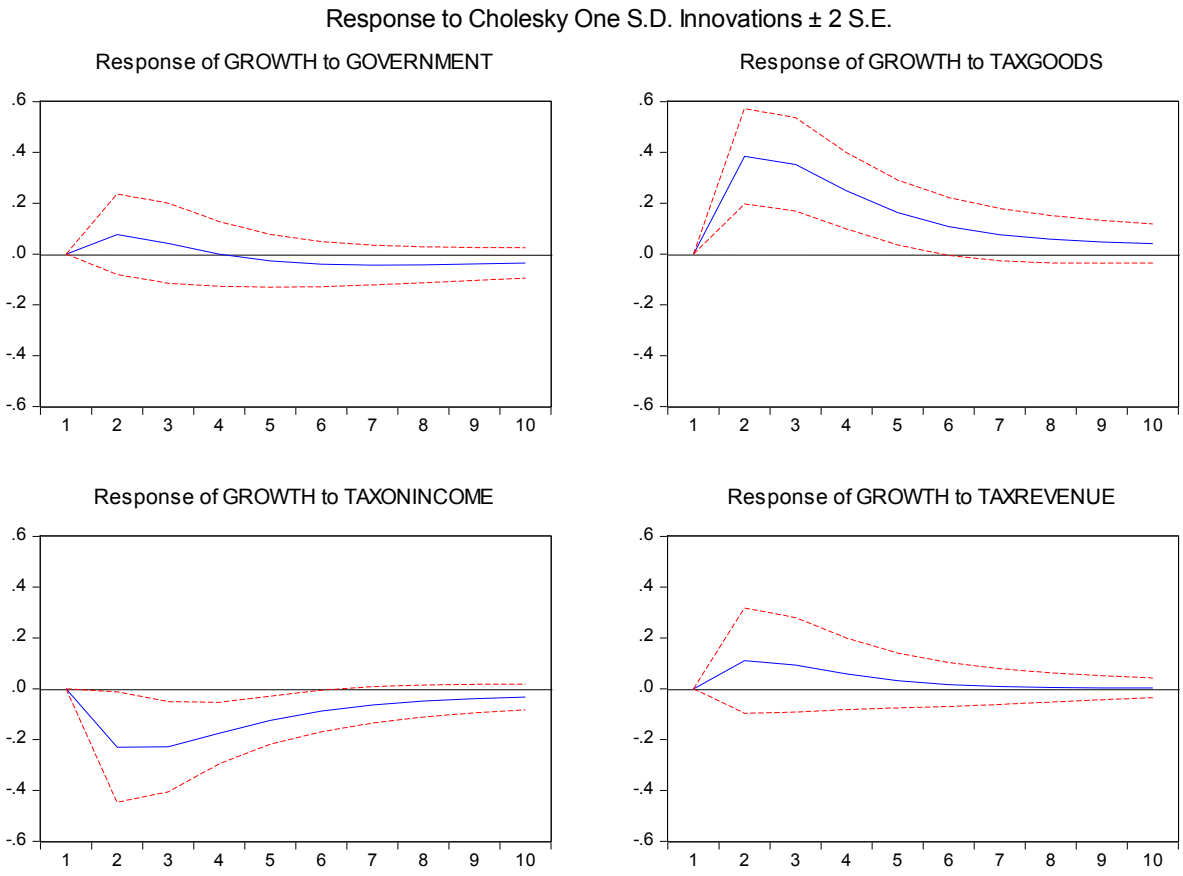

Figure 1. Impulse response economic growth of.

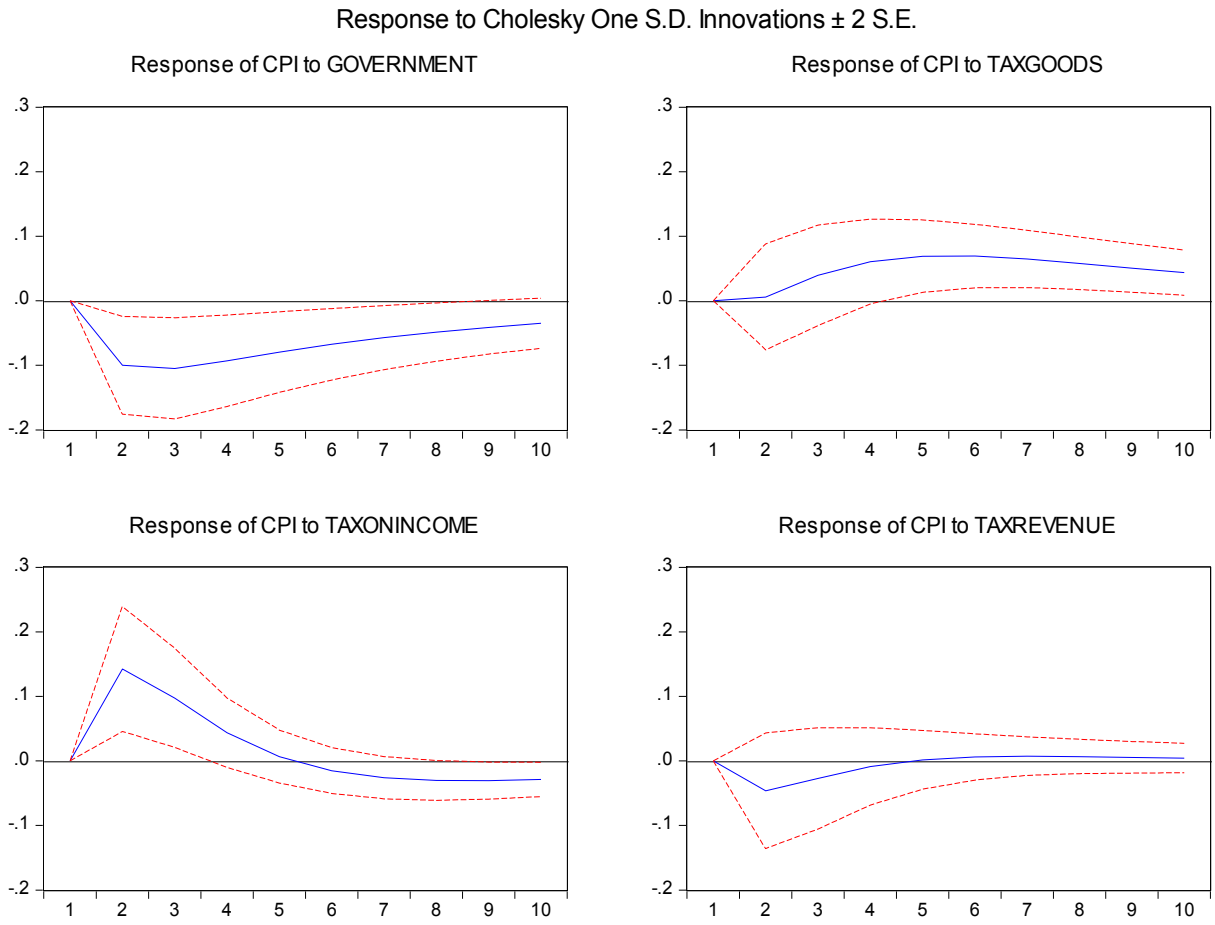

Figure 2. Impulse response of inflation.

Variance decomposition of inflation is demonstrated in Table 6. In the first period, 100 % of inflation standard deviation is explained by itself. This share reduces in subsequent period just to 95 %.

Table 4. Variance Decompositions of Inflation.

Period	S.E.	CPI	GOVERNMENT	TAXGOODS	TAXINCOME	TAXREVENUE
1	77.55	100.0	0.000	0.000	0.000	0.000
2	78.80	97.62	0.541	1.734	0.011	0.082
3	79.33	96.38	0.646	2.801	0.032	0.130
4	79.60	95.74	0.663	3.389	0.055	0.147
5	79.75	95.39	0.667	3.709	0.076	0.150
6	79.84	95.26	0.664	3.881	0.092	0.150

7	79.88	95.10	0.669	3.979	0.105	0.150
8	79.91	95.04	0.670	4.019	0.115	0.152
9	79.92	95.00	0.670	4.043	0.122	0.156
10	79.93	94.98	0.671	4.054	0.126	0.160

Variance decomposition of growth rate is showed in Table 5. In the first period, 100 % of growth standard deviation is explained by itself. This share reduces in subsequent period just slightly to 98.53 %.

Table 5. Variance Decompositions of Economic Growth.

Period	S.E.	GROWTH	GOVERNMENT	TAXGOODS	TAXINCOME	TAXREVENUE
1	3.825	100.0	0.000	0.000	0.000	0.000
2	4.004	99.77	0.181	7.19E-05	0.043	5.49E-05
3	4.025	99.28	0.185	0.341	0.152	0.031
4	4.044	98.85	0.305	0.522	0.252	0.067
5	4.049	98.69	0.362	0.574	0.280	0.089
6	4.050	98.63	0.366	0.606	0.293	0.102
7	4.051	98.58	0.366	0.629	0.301	0.112
8	4.051	98.56	0.366	0.644	0.305	0.120
9	4.052	98.54	0.366	0.652	0.307	0.126
10	4.052	98.53	0.367	0.656	0.308	0.130

The results indicate that economic growth in developing countries relies on government expenditure.

4. CONCLUSIONS

Main purpose of this article is analyzing the impact of fiscal policy on inflation and growth in developing countries during the period 1990- 2011 by using PVAR approach. According to results from impulse response function and variance decomposition, in short run, growth rate increases through government expenditure shock, but in long run it reacts in opposite direct and reduces. Moreover, these shocks reduce inflation. Tax shocks increase economic growth slightly in short run, with no chief effect in long run, the same as Solo Model. Tax shocks initially reduce Inflation, but in long term it increase slightly, according to the

theoretical studies. Developing countries rely on government expenditure for achieve growth and increasing taxes will lead to higher inflation. Moreover, the findings confirm this supposition that indirect tax has more effect than other kinds of taxes in economic macro level.

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